

Application Serial No.: 10/004,363

REMARKS

Claims 1, 2, 3, 5, 7 through 18, and 20 through 23 are in the application, with Claims 1, 5, 12, 13, 14 and 17 having been amended, and with Claim 6 and 24 through 29 having been cancelled. Claims 1, 12, 13 and 17 are the independent claims herein. No new matter has been added. Reconsideration and further examination are respectfully requested.

The previous Office Action mailed January 12, 2005 did not address newly-added claims 24 through 29. Accordingly, the present Office Action was issued to address Claims 24 through 29 and to restart the period for responding. Applicants submit that the present Office Action again fails to address the specific language of Claims 24 through 29 in the manner required to support a rejection under 35 U.S.C. §102 (see M.P.E.P. §2131) or §103 (see M.P.E.P. §2143.03). In view of the Office Action's failure to properly address this language, which is now roughly incorporated into respective independent claims, Applicants respectfully request that any subsequent rejection of the independent claims is not made final.

Double Patenting Rejections

Claims 1 through 3, 5 through 18 and 20 through 29 were rejected for obviousness-type double patenting over the claims of U.S. Patent No. 6,535,574 and over the claims of U.S. Patent Application Serial No. 10/051,088. As previously stated, the propriety of these rejections is not conceded and Applicants currently intend to file Terminal Disclaimers to obviate the rejections once the present application is otherwise deemed to be in condition for allowance.

Prior Art Rejections

Claims 1 through 3, 5 through 18 and 20 through 29 were rejected under 35 U.S.C. §102 as allegedly anticipated by U.S. Patent No. 6,405,072 to Cosman. Reconsideration and withdrawal of the rejection are respectfully requested.

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Claims 1 and 17

Amended independent Claim 1 relates to acquisition of first three-dimensional surface data representing at least a portion of a patient's body while the patient is in a first position substantially maintained during a computed tomography scan, acquisition of second data independent from the first data and representing at least one internal three-dimensional portion of the patient's body while the patient is in the first position, determination of a location of an isocenter of the patient based on the second data, and conversion of the first three-dimensional surface data to a coordinate frame of the patient based on the location of the isocenter. Claim 1 further concerns acquisition of third three-dimensional surface data representing at least the portion of the patient's body while the patient is in a second position substantially maintained in preparation for radiation treatment to be delivered by a radiation treatment station, conversion of the third three-dimensional surface data to a coordinate frame of the radiation treatment station, and determination of if the first position corresponds to the second position by directly comparing the converted first three-dimensional surface data to the converted third three-dimensional surface data.

Some embodiments of the foregoing features may provide efficient determination of whether a patient's position at a radiation treatment station corresponds to a position that was maintained during a computed tomography scan.

Cosman describes several systems for positioning a patient for radiation treatment, but does not remotely disclose or suggest the specific elements of amended Claim 1. For example, Cosman does not disclose or suggest acquisition of second data representing at least one internal three-dimensional portion of a patient's body while the patient is in a first position substantially maintained during a computed tomography scan, determination of a location of an isocenter of the patient based on the second data, conversion of first three-dimensional surface data of the first position to a coordinate frame of the patient based on the isocenter location, conversion of third three-dimensional surface data of the patient in a second position substantially maintained in preparation for radiation treatment to be delivered by a radiation treatment station to a coordinate frame of the radiation treatment station, and determination of if the first position corresponds to the second position by directly comparing the converted first three-dimensional surface data to the converted third three-dimensional surface data.

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The Office Action alleges that col. 3, lines 54 through 67, col. 6, lines 39 through 59, and col. 15, line 8 through col. 16, line 42 of Cosman teach "the therapy system LINAC as well as the images (camera obtained image and scanned) are correlated on the basis of the isocenter point 7 and its 3D location". Such an allegation does not reflect the elements of amended independent Claim 1 and therefore cannot support a rejection of Claim 1. As noted in M.P.E.P. §2143.03, "[a]ll words in a claim must be considered in judging the patentability of that claim against the prior art." Even though Cosman and the invention of Claim 1 both involve "correlating" a LINAC to a patient isocenter, the correlation described in the cited portions of Cosman does not disclose or suggest the correlation of Claim 1. Each of the cited portions will now be discussed in turn.

Col. 3, lines 54 through 67 indicates that LINAC machines define an isocenter at the convergence point of emitted X-ray radiation and an axis of gantry rotation. Col. 6, lines 39 through 59 describes a procedure for determining a three-dimensional position of such a LINAC isocenter in the coordinate space of a camera system C located in the same room as the LINAC. Col. 15, line 8 through col. 16, line 42 describes a procedure to determine a location of a target within a patient's body with respect to a LINAC used to treat the target. According to the described procedure, block 35 provides image scan data that associates the target with reference points on the surface of the patient. Next, in a LINAC treatment room, locations of the reference points are determined in relation to the LINAC. The locations are then correlated to the image scan data to provide the location of the target with respect to the LINAC.

None of the cited portions therefore disclose or suggest the specific amended language of Claim 1. Specifically, nowhere is Cosman seen to disclose or suggest at least comparing the claimed converted first three-dimensional surface data to the claimed converted third three-dimensional surface data. In more detail, Cosman is not seen to disclose or suggest at least comparing first three-dimensional surface data of a first patient position (substantially maintained during a computed tomography scan) that is converted to a coordinate frame of the patient based on an isocenter location (determined from second data representing at least one internal three-dimensional portion of the patient's body while the patient is in the first position) to third three-dimensional surface data of the patient in a second position (substantially maintained in preparation for radiation treatment) that is converted to a coordinate frame of a radiation treatment station.

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Claim 1 is therefore believed to be in condition for allowance. Claim 17 relates to a medium storing controller-executable process steps that roughly correspond to the method of Claim 1. Claim 17 is therefore also believed to be allowable for at least those reasons presented above with respect to Claim 1. Withdrawal of the rejections of Claims 1, 17 and their respective dependent claims is therefore respectfully requested.

Claim 12

Currently-amended independent Claim 12 relates to a method including acquisition of computed tomography data of a patient while the patient remains substantially in a first position, acquisition of first three-dimensional surface data of the patient independent from the computed tomography data while the patient remains substantially in the first position, determination of a radiation treatment plan based on the computed tomography data, the three-dimensional data, and data representing a physical layout of a radiation treatment station, determination of a location of an isocenter of the patient based on the computed tomography data, and conversion of the first three-dimensional surface data to a coordinate frame of the patient based on the location of the isocenter. The method further includes acquisition of second three-dimensional surface data of the patient while the patient remains substantially in a second position at the radiation treatment station, conversion of the second three-dimensional surface data to a coordinate frame of the radiation treatment station, determination of whether the first position corresponds to the second position by directly comparing the converted first three-dimensional surface data to the converted second three-dimensional surface data, and delivery of radiation to the patient according to the radiation treatment plan if it is determined that the first position corresponds to the second position.

The outstanding Office Action does not address the specific language of Claim 12, which was roughly included in previously-presented Claims 26 and 27. In contrast to Claim 12, Cosman describes the determination of a target location within a patient's body with respect to a device. The determination proceeds by locating reference points on the surface of the patient and correlating the located reference points to previously-acquired scan data which indicates the position of the target with respect to the reference points.

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Consequently, Cosman is not seen to disclose or suggest at least acquisition of computed tomography data of a patient while the patient is in a first position, determination of a location of an isocenter of the patient based on the computed tomography data, conversion of first three-dimensional surface data of the patient in the first position to a coordinate frame of the patient based on the isocenter location, conversion of second three-dimensional surface data of the patient in a second position at a radiation treatment station to a coordinate frame of the radiation treatment station, and determination of whether the first position corresponds to the second position by directly comparing the converted first three-dimensional surface data to the converted second three-dimensional surface data.

Claim 12 is therefore believed to be in condition for allowance and withdrawal of the rejection thereof is respectfully requested.

Claim 13

Independent Claim 13 concerns a system which includes a computed tomography scanning device for acquiring computed tomography data of a patient while the patient is in a scanning position, a first surface photogrammetry device for acquiring first three-dimensional surface data independent from the computed tomography data of at least a portion of the patient's body while the patient is in the scanning position, and an operator station for determining a location of an isocenter of the patient based on the computed tomography data, and for converting the first three-dimensional surface data to a coordinate frame of the patient based on the location of the isocenter. The claimed system also includes a radiation treatment station for delivering radiation to the patient, a second surface photogrammetry device for acquiring second three-dimensional surface data of at least the portion of the patient's body while the patient is in a treatment position on the radiation treatment station, and a controller for converting the second three-dimensional surface data to a coordinate frame of the radiation treatment station, and for determining if the treatment position corresponds to the scanning position by directly comparing the converted first three-dimensional surface data to the converted second three-dimensional surface data.

The Office Action fails to even allege, as required by M.P.E.P §2131, that Cosman discloses the elements of Claim 13. Moreover, Cosman, as described above, does not disclose

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any devices to acquire computed tomography data of a patient while the patient is in a first position, determine a location of an isocenter of the patient based on the computed tomography data, convert first three-dimensional surface data of the patient in the first position to a coordinate frame of the patient based on the isocenter location, convert second three-dimensional surface data of the patient in a second position at a radiation treatment station to a coordinate frame of the radiation treatment station, and determine whether the first position corresponds to the second position by directly comparing the converted first three-dimensional surface data to the converted second three-dimensional surface data.

Claim 13 is therefore believed to be in condition for allowance, and withdrawal of the rejection thereof is respectfully requested.

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CONCLUSION

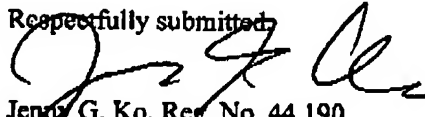
The outstanding Office Action presents a number of characterizations regarding each of the applied references, some of which are not directly addressed herein because they are not related to the rejections of the independent claims. Applicants do not necessarily agree with the characterizations and reserves the right to further discuss those characterizations.

For at least the reasons given above, it is submitted that the entire application is in condition for allowance and such action is respectfully requested at the Examiner's earliest convenience. Alternatively, if there remains any question regarding the present application or any of the cited references, or if the Examiner has any further suggestions for expediting allowance of the present application, the Examiner is cordially requested to contact the undersigned.

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Respectfully submitted,



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